REPORT NO. 79-2-12

SEPTEMBER 1979
3430

BIOLOGICAL EVALUATION OF THE SOUTHERN PINE BEETLE ON THE TOMBIGBEE NATIONAL FOREST IN MISSISSIPPI

by

Catherine R. Stein[1/]

A biological evaluation was conducted on the Tombigbee National Forest the week of August 6 to 10, 1979. The purpose of the evaluation was to determine the current status of southern pine beetle (Dendroctonus frontalis Zimmerman) populations on the district and to determine what action, if any, would be necessary in FY 80.

METHOD OF EVALUATION AND ANALYSIS OF SPB INFESTATION

Aerial Survey and Ground Checks

Standard aerial sketch map procedures were used for this evaluation, except that survey coverage was 100 percent.[2/] The survey was made by district personnel and spots of red and/or fading trees were recorded and plotted on Forest Service Class A maps. The spots were stratified by size class (1-25 and 26-50 trees, aerial observation). Ten percent, or a minimum of 10 spots per district, were selected for ground checking using a stratified random sampling scheme. Spots were stratified by size class (1-25, 26-50, >50 trees, aerial observation). Ground check data, including the numbers of vacated and infested trees, were recorded. Bark samples (12" x 12") for attack:emergence analysis were collected (five samples, if ≥ 10 vacated and infested trees; three samples, if < 10 vacated and infested trees).

Attack:Emergence Evaluation

The attack:emergence analysis procedure for estimating subsequent mortality from SPB infestations was adapted as a predictive tool.[3/] This procedure predicts future spot growth based on the ratio of

---

1/ Entomologist, USDA, Forest Service, Southeastern Area, State and Private Forestry, Pineville, La.

2/ Detection of Forest Pests in the Southeast, 1970. USDA, Forest Service, Southeastern Area, State and Private Forestry, Publ. S&PF-7. Atlanta, Ga. 51 pp.

3/ Moore, Gordon E. 1977. Factors for determining trends in southern pine beetle spots. J. Environ. Entomol. Vol. 7, No. 3. pp 335-341.

4/ This methodology is being used on a trial basis. Further analysis and evaluation must be made before further use.

southern pine beetles entering the trees to the number of beetles emerging (this is both attacking adults and developed brood). For purposes of this evaluation, the procedure will be referred to as the attack:emergence ratio. A prediction of SPB increase would require an attack:emergence ratio of 1:10 or greater. Attack:emergence ratios for spots predicted to remain static in growth would be 1.5 - 1:9.9. A decreasing population would have an attack:emergence of less than or equal to 1:4.9. This procedure has been proven on a spot basis for a 2-year period in North Carolina.[5/] This evaluation assumes that spot growth as predicted by the attack:emergence bark sample analysis is indicative of SPB population growth on the forest on an area basis. For example, if attack:emergence ratios predict increased populations within the sample spots, then the assumption would be that an increased amount of volume will be lost (or an increased number of trees will be killed) by SPB area-wide on the district.

Volume Protected Determination

The volume which would be protected by having a suppression project was estimated by use of spot growth formulae. Spot growth formulae estimate the amount a spot would grow if not salvaged. The difference between salvage volume and the size the spot would have grown if left alone is the volume protected.[6/]

RESULTS

Aerial Survey and Ground Checks

Forty-three SPB infestations were found ranging from 11 to 50 red and fading trees. Thirty spots were in the 1-25 tree size class and 13 were in the 26-50 tree size class. Ten spots were ground checked: seven in the 1-25 tree class and three in the 26-50 tree class. Ground check data and attack:emergence bark analysis data are summarized in table 1.

Attack:Emergence Evaluation

The average attack:emergence ratio was found to be static-increasing (A:E = 1:8.6). Based on the attack:emergence procedure, FY 80 losses should be from 1.0 to 1.5 times the loss experienced in FY 79. Because of the infested red:green tree ratio (table 1), an increasing condition of 1.5 was considered the best prediction for FY 80 losses. Thus, FY 80 mortality should be one and one-half times greater than the mortality sustained in FY 79.

5/ Moore, op cit,

6/ Hedden, R. L. 1979. Southern pine beetle spot growth inactivity in East Texas. Forest Sci. In press.

Table 1. Summary of ground check data and attack:emergence bark analysis data for Tombigbee National Forest, August, 1979.

Aerial Size	Total No.	No. Infested Trees			No. Vacated Trees		Attack:Emergence Ratio	Red:Green[a/]
		Total	Green	Reds & Faders	Total	Reds & Faders		
30	214	67	30	37	147	90	1:11.58	1:0.81
30	220	113	77	36	107	25	1: 5.93	1:2.00
30	226	129	103	26	97	54	1:11.00	1:3.73
20	140	57	28	29	83	63	1: 6.84	1:0.97
20	114	54	43	11	60	37	1:11.04	1:3.91
15	142	100	64	36	42	24	1:11.20	1:1.78
15	224	153	94	59	71	14	1: 5.74	1:1.59
15	101	83	36	47	18	14	1: 7.83	1:0.77
15	129	82	63	19	47	25	1: 6.23	1:3.32
11	13	0	0	0	13	2	[b/]	-

[a/] Based on numbers of infested reds and faders compared to numbers of green infested trees. Average R:6 1:1.9; that is, an average of 1.9 green trees is present for each infested red or fading tree in the sample spots.

[b/] No attack:emergence ratio was calculated for inactive spots because of methodology recommended by G. E. Moore (see footnote 3 in text).

Volume Protected Determination

Total volume protected as derived from Hedden's spot growth formula was found to be 1651.99 MBF.

DISCUSSION AND RECOMMENDATIONS

SPB suppression activities should continue on this forest. A salvage control action will minimize losses and prevent spot growth by removing infested material from the forest. Chemical suppression and/or cut-and-leave tactics are recommended only for inaccessible spots or for small spots that cannot be administered any other way. Forest Insect and Disease Management, Pineville, Louisiana, should be contacted prior to the extensive use of chemical control for an update on latest restrictions or application procedures. If cut-and-leave is to be used, district personnel should plan a training session with FI&DM before the summer season (the summer is the only time this method is recommended for use). All suppression activity should be done in accordance with the 3400 section, FSM, and the project control plan for the forest.

Predicting future timber mortality is difficult due to the occurrence of overlapping generations of beetles each year. The attack:emergence technique used for this evaluation predicts a mortality trend. This prediction technique has been proven accurate on a spot basis. For purposes of this evaluation, assumptions are that spot sizes and distribution within each age class of timber will remain the same.

While direct suppression activities are necessary, it is also possible to reduce future losses through preventative measures. Maintaining healthy, thrifty stands is one of the better ways to prevent SPB losses. Here are stand conditions the prescriptionist should look for to reduce SPB losses:

1. Avoid basal areas in excess of 120 sq ft/ac. Older, dense stands should be thinned as heavily as R-8 guides allow.

2. Make sure species is matched to site.

3. Note presence of ~~little~~leaf or annosus root rot sites. These sites have been shown to be problem SPB areas.

4. Plan for as little disturbance as possible when these stands are thinned. Damaged stands are more susceptible to bark beetle attack.

Many stands on this forest were planted at high stocking levels during the CCC days of the 1930's. These stands are now heavily stocked and should be closely analyzed for need of remedial silvicultural treatment to lessen SPB hazard. If these stands are thinned, FI&DM recommends using the R-8 thinning guides as the maximum leave basal area.

The Tombigbee National Forest has a vigorous SPB population. It is important that suppression action be taken to minimize timber loss and to stop spot growth in the larger spots. Because of expected SPB activity, the forest needs to plan enough technician time to implement the work required to meet project objectives.

For further information, contact Forest Insect and Disease Management, Pineville Field Office, Pineville, La. 71360 (Phone FTS 497-3311, or Commercial 318-445-6511, Ext. 311).

WITHOUT PROJECT

Tombigbee District

	Age	25	35	45	55	Mature	
2	Volume Threatened MBF	142.58	0	524.13	413.64	571.64	
3	Years to Harvest	35	25	15	5	-	
4	Volume at Harvest MBF	400.65	-	670.89	438.46	571.64	
5	Green Stumpage Price $	185.00	185.00	185.00	185.00	185.00	
6	Value at Harvest $	74,120.25	-	124,114.65	81,114.80	105,753.40	
7	Present Value @ 6 7/8%	7,243.75	-	45,815.08	58,188.03	105,753.40	Total =$217,000.26
8	Present Value @ 10%	2,636.28	-	29713.72	50365.90	105,753.40	Total =$188,469.30

9	Estimated Volume Killed MBF	2243.46	14 Threatened Volume Salvaged	-
10	Estimated Volume Salvaged MBF (16%)	358.95	15 Salvage Stumpage Price	-
11	Estimated Volume Lost MBF	1884.51	16 Value of Salvage	-
12	Salvage Stumpage Price $	72.00		
13	Value of Volume Lost $	135684.46		

		@ 6 7/8%	@ 10%
17	Total Value Lost Without Project:	$352,684.72	$324,153.76

WITH PROJECT

	Age	25	35	45	55	Mature	
2	Volume Threatened MBF	34.00	-	124.98	98.63	136.34	336.34 MBF
3	Years to Harvest	35	-	15	5	-	
4	Volume at Harvest MBF	95.54	-	159.97	104.55	136.34	
5	Green Stumpage Price $	185.00	-	185.00	185.00	185.00	
6	Value at Harvest $	17674.90	-	29594.45	19341.34	25222.90	
7	Present Value @ 6 7/8%	1727.36	-	10924.35	13874.83	25222.90	Total =$51,749.44
8	Present Value @ 10%	628.65	-	7085.07	12009.66	25222.90	Total =$44,946.28

9	Estimated Volume Killed MBF	2243.46	14 Threatened Volume Salvaged	
10	Estimated Volume Salvaged MBF (80%)	1794.77	15 Salvage Stumpage Price	
11	Estimated Volume Lost MBF	448.69	16 Value of Salvage	
12	Salvage Stumpage Price $	72.00		
13	Value of Volume Lost $	32,305.82		

		@ 6 7/8%	@ 10%
17	Total Value Lost With Project:	$268,629.46	$246,901.66

	@ 6 7/8%	@ 10%
Project Benefit:	$234,169.94	$212,442.14
Project Cost:		
Net Present Value:		
Benefit Cost Ratio:		